The Cologne Database for Molecular Spectroscopy, CDMS: spectroscopic data for Astrochemists and Astrophysicists

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The interpretation and analysis of astronomical observations crucially depends on the knowledge and availability of accurate rest frequencies and intensity information. Such information is usually generated from laboratory data for rest frequencies and complemented by quantum chemical calculations for intensity information.

The CDMS was founded in the year 1998 to provide such information for atoms and molecules of astrophysical and atmospheric interest to the astronomical and spectroscopical community in a standardized way. At present, the catalog covers mostly rotational transitions from the radio-frequency to the terahertz region and lower mid-infrared region. Its entries, together with those in the JPL catalog, cover a large fraction of more than 200 molecules detected in the interstellar medium (ISM) or in circumstellar envelopes (CSEs) of late type stars. Both databases are accessible through the Virtual Atomic and Molecular Data Centre.

Radio astronomical spectra are often analyzed under the assumption of local thermodynamic equilibrium (LTE), but deviations from LTE may be considerable at lower temperatures, especially in the diffuse ISM. In these cases it is often necessary to take into account collisional processes with H_2, He and/or with H and electrons. This task, to access and combine spectroscopic data together with collisional data, has been greatly simplified thanks to the infrastructure and tools developed by VAMDC.